first three days. Most of our bed patients had by then become ambulatory, especially those with injuries involving the upper extremities, and the need for morphine showed a marked decline. Only those who were severely injured still showed any evidence of shock. Despite the large number of wounded and the extent of their wounds, we had no psychological problems.

Plaster of Paris was used freely. Wounds of any great size were immobilized, either by splints or light circular casts, whenever possible. This added greatly to the comfort of the patient and, we believe, must have hastened the wound-healing.

COMMENT

Of the sixteen patients who died, all but one expired in the first forty-eight hours, and over one-half in the first twelve. Most of the deaths were due to multiple fragmentary wounds with severe loss of tissue and profound shock. In only one was operative treatment given, it not being felt that it would be of value in the others. No amputations were performed, but two traumatic amputatoins of a major extremity were received. One had a disarticulation at the knee and was in such deep shock that no further surgery was attempted; and despite supportive treatment including large doses of morphine and three units of plasma, the patient expired in a few hours.

Since many of the wounded had been rescued with difficulty, facilities for treatment very limited, and the hazards and suffering which they had to go through, before being received aboard easily explains why many were not in physical condition to withstand further handling. The relief from pain and the associated shock were considered the most urgent. No radical procedures, therefore, were undertaken, nor was any elective reconstructive surgery attempted. Except for a few instances, first-aid surgery was all that we felt it advisable to do.

We received aboard several hundred non-wounded survivors, in addition to their medical personnel already mentioned. These proved invaluable in helping us render aid to the wounded. Many freely volunteered their services, and thereby greatly relieved the available hospital corpsmen. It should also be mentioned that these same members of the ship's company had been responsible for the saving of many lives prior to being received on board. During the naval engagement, the casualties occurred so rapidly that no medical personnel could possibly have been so omnipresent as to be available to treat them all. Time, the compartmentation of the ship, the rapidity of the casualties, the rapidity in which the ships sank, the darkness, and many other factors made it necessary that the uninjured survivors render first aid to their own wounded if any was to be given. For this reason it is felt that the importance of the knowledge of first-aid among the members of a ship's company should be widely understood, and that it is paramount that they receive adequate and repeated instruction in at least the principles involved.

IN CONCLUSION

Although it might appear that one cannot do justice to such a large number of acute casualties in such a short space of time, we were greatly impressed by the rapid general clinical improvement which occurred in the first five days that they were aboard, and we feel that most of this improvement was due to recovery from their primary shock, and that it was too early for any toxemia to have developed from a severe infection. We were also impressed by the result obtained by conservative surgery, namely, not attempting anything that would add greatly to the shock of an already severely shocked patient, until adequate recovery had occurred. Most of our injured were compelled to lie on the deck on a stretcher until they were taken to surgery, and from there placed in their respective bunks. This delay, in most instances, was not harmful. They were not excessively handled, their complaints were given attention, sedation and oral fluids were administered freely, and much needed rest and nourishment was provided; and these factors we feel were largely responsible for any of the beneficial results obtained.

U. S. Naval Hospital.

FOOD POISONING DUE TO CUSTARD FILLED PASTRY: REPORT OF OUTBREAK

CAUSATIVE ORGANISM, B. TYPHI-MURIUM

J. C. Geiger, M. D.
AND
A. B. Crowley
San Francisco

WITHIN a six-day period, from March 24 through March 30, 1944, there were reported 69 cases of food poisoning in San Francisco. The symptoms were vomiting, nausea, diarrhea, with chills and often fever. The onset period varied from three to seven hours after the suspected food was consumed.

Fifty-one of the persons afflicted partook of food at a church dinner, and the remaining eighteen were from six unrelated families residing in different residential areas of the city. All except one case gave a history of having eaten custard-filled eclairs. Epidemiologic investigation disclosed that all of the pastry was purchased from bakery "A." This firm manufactures all products in a central plant, and distributes through nine retail stores, six of which were outlets for the contaminated food involved in this outbreak.

All case histories definitely indicated that the causative food was purchased on March 22, 1944. The first case of illness was reported during the late afternoon of March 24th. The late reporting precluded the possibilities of obtaining specimens of the causative materials or stool specimens from victims. There were, however, two excep-

* From the Department of Public Health, San Francisco, California.

tions: a custard-filled eclair had been taken home by one of the persons who had attended the church dinner. The laboratory examination of the eclair was negative for food poisoning organisms; coli-aerogenes group confirmed. Secondly, among the groups reported, the "D" family had six children, five of whom were hospitalized in the Isolation Division of the San Francisco County Hospital of the Department of Public Health. The laboratory examination of feces of all five was positive for B. typhi-murium, but the findings on the rodent feces or droppings collected in the central plant were negative.

The negative findings for food poisoning organisms in the one recovered eclair, and the fact that all retail outlets of Bakery "A" were not involved, were typical of the spotty distribution of infection of the food, commonly found in such cases. Bakery "A," however, had been involved in previous minor outbreaks over a period of several years, the infected organisms isolated being hemolytic staphylococcus aureus.

Bakery Sanitation:

The general sanitation of bakery "A" was found to be good. Working methods, however, were not satisfactory. A tremendous increase in production, and insufficient and untrained workers were the obvious reasons for carelessness, most noticeable in the scullery department. The Department of Public Health has certain regulations governing sterilization of utensils, cooking of the custard (boiling for a minimum period of five minutes), cooling (to 45° within 30 minutes), proper refrigeration, personal hygiene and clean clothing of those engaged in the preparation and handling of the product, transportation and protection of the product until its ultimate sale.

Bakery "A" was complying in all but several features of the regulations. These, however, were the most important: cleanliness of utensils, rapid cooling and proper refrigeration. Investigators found gross negligence in the washing and storage of baking pans and pots. After washing in an unsatisfactory manner, this equipment was so stored as to be readily contaminated by flies, dust or rodents, and rat infestation was demonstrated in the storage room.

The custard was prepared at 6:00 a.m., poured into shallow pans and allowed to cool at room temperature until 10:00 a.m., at which time it was processed into eclairs, puffs and cakes. The mix consisted of one gallon of water (16 oz. of powdered milk added), 2 lb. of sugar, 12 oz. of cornstarch, 16 egg yolks (fresh), salt and vanilla flavoring. The slow cooling process provided ideal temperature for optimum growth of any toxin-producing organisms, if specific bacteria had contaminated the pans prior to the custard being poured therein, or the custard mix itself during the cooling period.

From the epidemiologic investigation and the laboratory findings of B. typhi-murium in stool specimens of five patients, plus evidence of rodent infestation in Bakery "A," it was concluded that the custard from bakery "A" made on March 22, 1944, was the causative food. Either the custard itself was directly infected while cooling, which was not unlikely, or it was indirectly contaminated through the pans used and their improper cleansing.

It is customary for bakers in San Francisco to manufacture custard products practically every day of the year. The 22nd day of March, 1944, was quite warm, the temperature having reached a maximum of 72°, which is well above normal.

For the past several months, samples of commercially-prepared custard products from different sources have been examined at weekly intervals. The *p*H is determined and bacteriologic examination for organisms of the food poisoning and coli-aerogenes groups is made. If any of these bacteria are found, an inspector immediately visits the factory, and endeavors to locate and eliminate the source. Utmost coöperation has been afforded by the entire industry. Efforts are being made to inform all consumers by labeling packages with a statement that the article is perishable and should be under refrigeration until ready to serve.

In such findings on 50 specimens, the *p*H varied from 3.98 to 6.85, the average being 5.98; coli-aerogenes group was confirmed in 13 specimens; coli-aerogenes group and nonhemolytic staphylococcus aureus were found in 9; coli-aerogenes group and hemolytic-staphylococcus aureus in one; and nonhemolytic staphylococcus aureus in one. The remaining 26 were negative.

DISCUSSION

Sixty-nine cases of illness from contaminated custard eclairs were reported to the San Francisco Department of Public Health within a period of six days. Fifty-one were from one church dinner group, the remainder from six unrelated families. All onsets of illness were within seven hours after eating the causative food manufactured on March 22nd. Stool specimens of five patients were found positive for B. typhi-murium. Improper cleansing and protection of equipment, careless working methods in preparing and preserving the custard, and rodent infestation were found in bakery "A." Laboratory investigations indicate that organisms of the coli-aerogenes group are not uncommon in this product, and there were occasional findings of hemolytic and nonhemolytic Staphylococcus aureus. Certain inspection control activities have been developed to determine the cause of these bacterial contaminations and their elimination. It appears practical that a custard product of a *p*H of 4.0 or slightly higher does inhibit bacterial growth in custard or pastry filled with custard. Educational activities relating to handling of all equipment and finished products within the pastry industry, and as to proper storage and preservation by refrigeration in the home, will minimize and eliminate illnesses, such as food poisoning, from these products.

101 Grove Street.